

Patent Claims:

An elongated stopper device

1. An elongated stopper device for flow-control of molten metal from a vessel, containing molten metal, said device comprising:
 - a) a body (10) made of a refractory ceramic material,
 - b) a bore hole (12), having a longitudinal axis (A) and extending from an upper surface (10u) of said body downwardly,
 - c) said bore hole (12) being equipped along its length with at least one anchor (16) of a different material, fixed within said body (10) between the upper surface (10u) of said body (10) and a lower end of said bore hole (12) and projecting radially into said bore hole with its main surfaces (16u, 16l) running predominantly perpendicular to the longitudinal axis (A) of the bore hole (12),
 - d) said anchor (16) being adapted to receive and fix one threaded end (14l) of a metal rod (14), inserted into said bore hole (12).
2. Stopper device according to claim 1, wherein said metal rod (14) has an at least partially threaded section (14l) at its inserted end.

3. Stopper device according to claim 1, including a sealing member (18) being arranged adjacent to said anchor (16).
4. Stopper device according to claim 3, wherein said sealing member (18) being arranged along a circumferential wall (12u) of said bore hole (12) below said part (16), extending radially into said bore hole and longitudinally along a certain length (L) of said bore hole (12) and adapted to receive said rod (14) in a threadably manner.
5. Stopper device according to claim 3, wherein said sealing member (18) has a cylindrical shape.
6. Stopper device according to claim 3, wherein that part of the bore hole (12) receiving the sealing member (18) is conically designed with its smaller part at its lower end.
7. Stopper device according to claim 3, wherein said rod (14) has a smaller width at its part which first enters said sealing member (18) than at its part on top.
8. Stopper device according to claim 3, wherein said sealing member (18) is made of graphite.
9. Stopper device according to claim 1, wherein said anchor (16) has a sheet like shape with its main surfaces (16u, 16l) running predominantly perpendicular to the longitudinal axis (A) of the bore hole (12).
10. Stopper device according to claim 1, wherein said anchor (16) is made of at least two sheets each designed like a ring section and arranged at a distance to each other along an imaginary helical line.
11. Stopper device according to claim 1, wherein said anchor (16) is made of three sheets each designed like a ring section and arranged at equal distances to each other along an imaginary helical line.

12. Stopper device according to claim 1, wherein said anchor (16) is a snap ring.

13. Stopper device according to claim 12, wherein said snap ring encircles more than 180° .

14. Stopper device according to claim 12, wherein said snap ring encircles less than 360° .

15. Stopper device according to claim 12, wherein said snap ring encircles 360° .

16. Stopper device according to claim 12, wherein said snap ring encircles more than 360° .

17. Stopper device according to claim 12, wherein said snap ring encircles less than 450° .

18. Stopper device according to claim 1, wherein said anchor (16) is made of metal.

19. Stopper device according to claim 1, wherein said rod (14) has an axial bore (14c).

20. Stopper device according to claim 1, wherein the anchor(s) (16) are arranged at an angle α of between 1° and 5° with respect to a plane perpendicular to the longitudinal axis (A) of the bore hole (12).